

MARINE REVIEW.

VOL. XII.

CLEVELAND, O., NOVEMBER 7, 1895.

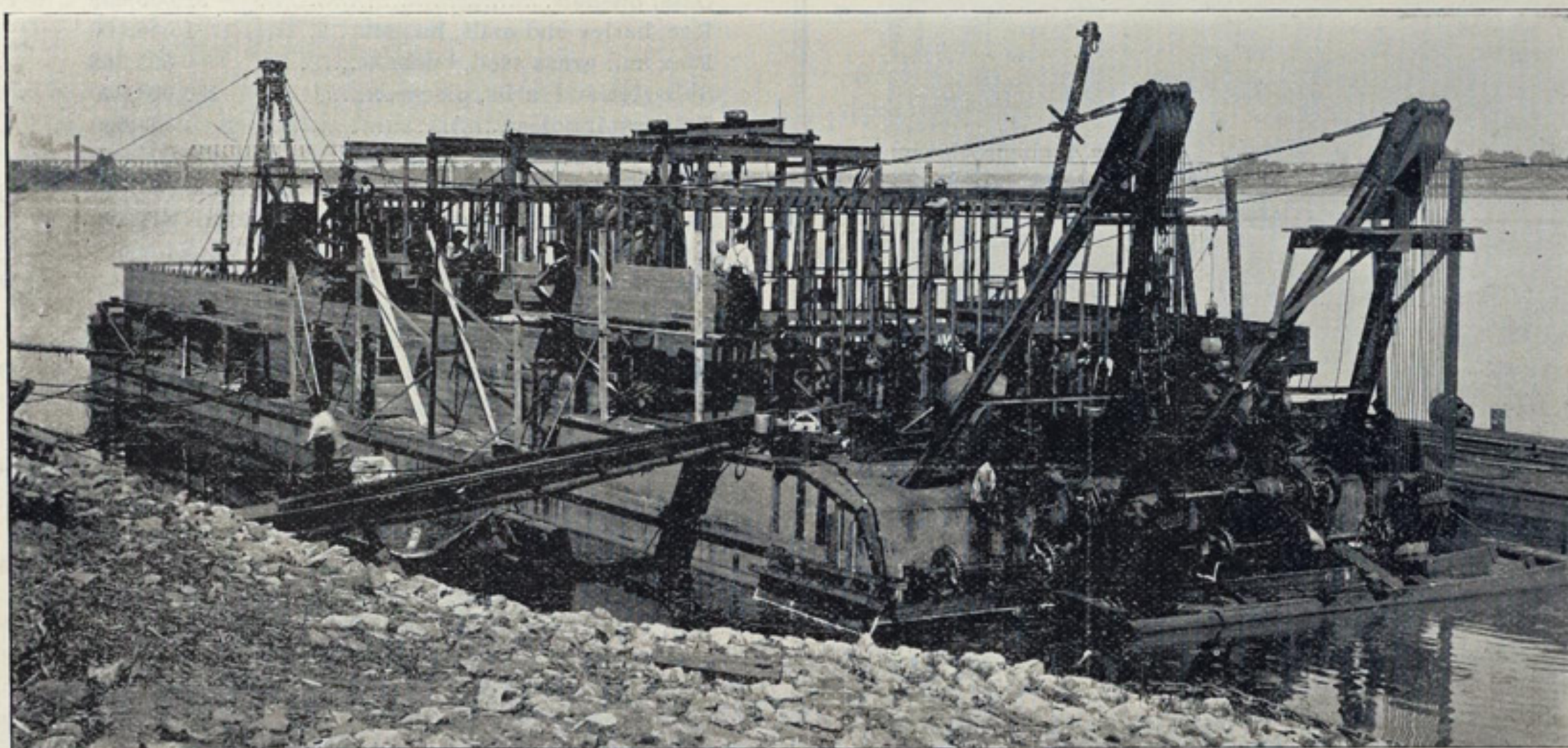
No. 19.

Largest Suction Dredge in the World.

A hydraulic suction dredge that is probably the largest machine of its kind in the world has just been completed at Cairo, Ill., under the direction of Lindon W. Bates, one of the best known hydraulic engineers of Chicago. The dredge was built for the Mississippi river commission, representing the United States government, and an official test of it will take place within a few weeks. Engineers have quarreled for years over the question as to whether or not it would pay to dredge out the channel of the Mississippi river where the sand bars always endanger and sometimes prevent navigation, but when the commission met in St. Louis a year ago it voted to give the dredging scheme an exhaustive test, and invitations were sent out to a score of the best hydraulic engineers in the country asking each to submit plans for a mammoth dredger capable of handling at least 1,600 cubic yards an hour. The requirements were fully given, and were considered beyond possible achievement by many engineers. Fifteen sets of plans and drawings were submitted by as many engineers. Of this number all but three were rejected on the first examination. These were considered practical, and the three engineers were asked to furnish drawings more complete in detail. It required several days' debate in the commission before the completed plan submitted by Lindon W. Bates of Chicago, was finally adopted and the contract given him. The contract price was \$175,000, with a maximum premium of 50 per cent. offered by the commissioners in case the dredge exceeded the specified requirements. It is believed

possible to cut 26 feet deep and over 200 feet wide at a slower rate of advance. This means that it will handle at least 3,000 cubic yards of sand every hour and remove every yard of it 1,000 feet from the scene of operations. This is what is expected of it when in operation, doing regular duty in eradicating sand bars or cutting new channels. Its estimated pumping capacity is 6,000,000 gallons of water an hour, or 144,000,000 in twenty-four hours. It will handle 27 cubic yards of sand in one minute in average work. This means 38,000 yards in a day, and under favorable circumstances this estimate will be considerably exceeded. At that rate it would cover an area of ten acres one foot deep with sand in ten hours. If the Chicago drainage canal was completed and then filled with sand it would hold about 40,000,000 cubic yards. Under favorable conditions the dredge could clean it all out in a little less than three years provided it worked twenty hours a day, except on Sunday, without breaking down or serious loss of time.

The active principle of the new machine is in what is called the "mechanical cutter system," which may be described as a sort of giant egg beater. These odd machines are six in number. They work in the sand at the bottom of the river. Driven by powerful high speed engines these "cutters" stir up the sand in the river bed at the intake of the group of suction pipes, also six in number, each 19 inches in diameter. The mixed sand and water is pumped from the bow to the stern of the boat and discharged there through two 36-inch discharge pipes, which are carried at the surface of the water on semi-hydraulic steel pontoons



MISSISSIPPI RIVER DREDGE.
Designed to remove more than 1,600 cubic yards of sand per hour.

the full premium will be paid, making the cost of the machine \$262,500. According to estimates it will do nearly double the required amount of work without crowding it beyond its normal capacity.

When in service this dredge will be accompanied by a flotilla of river craft necessary to its successful operation. There will be one large river steamer, a blacksmith barge, a pile driver, a quarter boat, and a number of barges. Some idea of the size and power of the dredge and equipment may be gained from the following table of weights and measurements:

Length of hull over all.....	172 feet.
Width of hull.....	40 feet.
Depth of hull amidship.....	7 feet 2 inches.
Height of engine room.....	24 feet.
Estimated weight of empty hull.....	310 tons.
Estimated weight of machinery.....	800 tons.
Estimated weight of fuel, etc.....	90 tons.
Total weight.....	1,200 tons.
Total engine power.....	3,000 horse power.

It is difficult to comprehend the immense capacity of such a machine without the aid of a few rough comparisons. It is designed to cut channels through sand bars in the bed of the river. It is estimated it will wade through one of these at the rate of 10 feet advance in every minute, cutting a swath from 40 to 65 feet in width and 6 feet deep. It is

to a distance of 1,000 feet from the dredge in any desired direction where the sand is discharged.

The immense power necessary to operate the great pumps is furnished by twin triple expansion 1,200-horse-power engines with four cylinders, each capable of 200 revolutions a minute. These engines drive the two main centrifugal pumps. Each of the pumps has a 36-inch suction pipe, which is carried forward to the bow of the boat, where each divides in three sections, each 19 inches in diameter. These pipes connect directly by means of a telescopic elbow with a 20-foot section to the battery of "cutters" working in the bed of the river. This makes one connection with the pump for each of the six "cutters." The "ladders" and suction pipes, together with the machinery necessary to operate them, weigh about ninety tons, which is the weight of a good sized locomotive. This much of the big machine works under water, entirely out of sight.

The "cutters" are of most ingenious workmanship. The "knives" in motion describe a circle 5 feet in diameter, and the whole "cutter" 6 feet in length. The speed of the "cutters" is thirty revolutions a minute driven by individual compound engines. In addition to the larger engines there are many smaller ones for special uses, making in all thirty-eight steam cylinders on board.

On the forward deck is a six-drum warping and swinging engine, compound geared. This engine controls the raising and lowering of the

"cutter" battery and the swinging movements of the dredge itself. This and all other engines are in control of one man, the chief operator or engineer, who stands in the pilot house and directs every movement of the boat and its machinery by the means of levers. He works in a wilderness of levers, whistle ropes, speaking tubes, electric bells, vacuum and pressure gauges—all necessary for the intelligent control of the complicated apparatus. The entire crew consists of seventeen men.

A complete electric light plant is a part of the equipment, with dozens of arc lights and two search lights. The dredge will cut a channel of any desired depth from six to twenty-six feet. It can cut just the width of the hull, forty feet, or, if desired, it can be made to swing from side to side and cut a wider swath, not exceeding 235 feet, without changing base.

Commander Oscar F. Heyerman.

Commander Oscar F. Heyerman, a naval officer in whose welfare lake vessel owners were very much interested, died at sea on the steamship Havel Oct. 27, while en route to visit relatives abroad. Commander



COMMANDER OSCAR F. HEYERMAN.

Heyerman was best known on the lakes as the inspector of the eleventh light-house district, with headquarters at Detroit. Shortly after coming to the lakes in 1890, and while holding to the ideas of most naval officers, who are proud of their knowledge of the science of navigation, and who do not like the idea of putting up too many stakes or buoys even in narrow channels, he became famous by declaring, upon a request being made of him for a few additional stakes at Grosse point, that the Lake Carriers' Association "wanted a long string of Chinese lanterns to pilot their vessels through the rivers." He redeemed himself with the vessel owners later, however, when in company with Col. Ludlow, light-house engineer, he opposed the light-house board in the establishment of a poor system of lights in the Sault river. He was right in this matter, but unlike Col. Ludlow, who fought the light-house board, and has since been assigned to most desirable duty in the army engineer corps, Commander Heyerman was sent to sea on the Kearsarge and lost that famous old ship on Roncador reef in the Caribbean sea. An excellent record up to this time was followed by a series of misfortunes, involving the loss of a favorite son and an illness that resulted in paralysis.

Commander Heyerman was fifty-one years of age. He was born in Prussia in February, 1844, and came to the United States when eight years of age, his parents taking up a home in Detroit. At the age of seventeen he was appointed acting midshipman from Michigan, and during the following year, 1861, he entered the naval academy at Annapolis. On Nov. 1, 1866, he was commissioned ensign and master one month later. He was commissioned lieutenant March 12, 1868; lieutenant commander Oct. 13, 1869, and on May 19, 1886, was promoted to commander. It was in February, 1894, after leaving the lakes that he lost the Kearsarge. On his return from the wrecked vessel he was tried by court martial and suspended for two years for the loss of his ship. The sentence was remitted and he was restored to duty Dec. 22, 1894. He was retired June 14, 1895, on account of ill health.

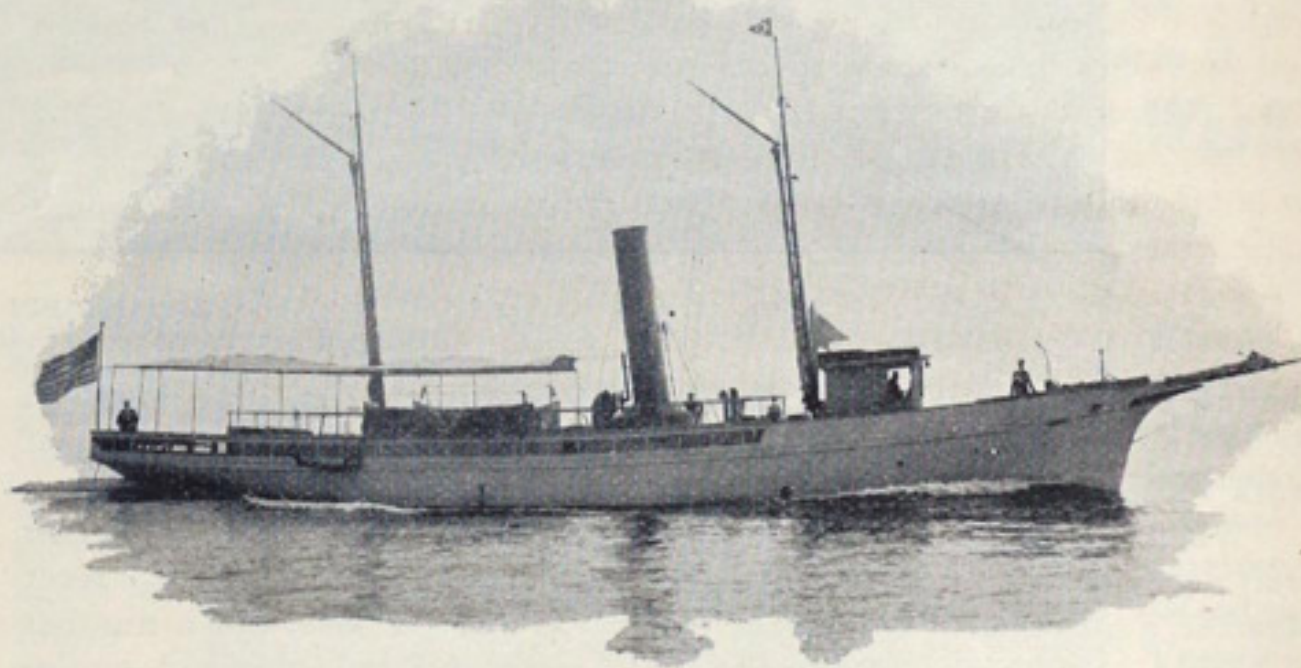
Commerce of Detroit River.

For a number of years past the annual reports forwarded to the chief of army engineers by the late Gen. O. M. Poe, have contained statistics regarding the commerce of the Detroit river. The law requires that engineers in charge of government works shall furnish statistical reports of commerce in the rivers and harbors in which funds are being expended. It is of course impossible to prepare a report, absolutely reliable, regarding the commerce of the Detroit river, on account of inadequate customs laws, and the statement furnished each year from the office of General Poe has been made up somewhat of estimates, but it is, nevertheless, the best summary that is to be had on the subject.

The report of Gen. Poe for the past fiscal year has not as yet been made public, but through the kindness of Col. H. Kallman, who has had immediate charge of the river improvements, the REVIEW is enabled to present the statistical report for 1894. Col. Kallman figures that the number of United States vessels passing the Detroit river during the season of 1894 was 34,800 of 26,120,000 registered tons. This is exclusive of Canadian vessels, which are not taken into account at all in the report. He also figures that the clearances of United States vessels from all collection districts on the lakes numbered 54,758, the registered tonnage of which 27,565,229. The commerce of the river during the season of 1894, comprising staples only, is reported as follows:

Commodities.	Amounts.	Net tons.
Iron ore and finished iron.....		6,448,445
Copper ore.....		99,573
Silver ore.....		412
Coal.....		6,264,590
Building stone.....		508,000
Cement, barrels.....	917,265	114,000
Wheat, bushels.....	57,337,278	1,749,600
Flour, barrels.....	14,810,482	1,487,048
Corn, bushels.....	45,394,308	1,800,000
Oats, bushels.....	31,000,000	511,500
Rye, barley and malt, bushels.....	1,556,000	38,700
Flax and grass seed, bushels.....	555,968	33,000
Shingles and laths, pieces.....	180,000,000	42,000
Telegraph poles.....	109,000	30,000
Logs, feet B. M.....	218,000,000	327,000
Lumber, feet B. M.....	1,109,165,000	2,150,000
Provisions, hogsheads.....	341,000	560,000
Merchandise, packages.....	5,450,000	2,160,000
Total.....		24,263,868

Another summary has reference to the number of loaded cars that crossed the river during the season of 1894. This total is 304,941, the eastbound cars numbering 183,618 and the westbound 121,323. At an average of twelve tons to a car this traffic across the river would aggregate 3,659,292 tons and at fifteen tons to a car the total would be 4,574,115 tons.



STEAM YACHT AMADIS,

Which was stolen for service of Cuban insurgents but recovered and now offered for sale in Cleveland.

Letters at Detroit Post Office.

Letters bearing the following names await owners at the marine post office, Detroit, Mich.:

Adass, A. J.	Hughes, Jos.	Rose, Mrs. Carl
Barnett, Ford	Laffory, Ben.	Siefert, Frank
Butterfield, Arthur	Laurence, Geo. C.	Sivan, Chas.
Duncan, F. A.	Lezotte, William	Shaw, James
Duncan, Miss F. A.	Lacy, Thomas	Tuscany, Columbus
Eaton, Mrs. Hoyt	McLellan, John	Van Rensselaer, Capt J.S
Gorlock, Capt. J. N.	Natan, Mrs. Ned	Weitzman, Frank E.
Glover, J. H.		

Lake Freight Matters.

Vessel owners may rest assured that unless a decided change occurs in the feeling that now prevails among ore sales agents in Cleveland there will be no general movement toward selling ore for next season and no chartering of vessels for next season's business until late next month and probably not until January. The disposition among the ore dealers is to delay sales until various interests in the iron business have a better knowledge of conditions that will prevail next year. The ore sales agents have held numerous meetings of late, which have been the subject of considerable comment, and stories of an attempt to regulate lake freights have been heard in various quarters, but if full reports of these meetings were given out it would probably be found that the subject of lake freights has not been discussed, and that the main effort of the ore men at this time is to come to some understanding with Mesabi mine owners who were not taken into the Bessemer ore agreement of a year ago. This big Mesabi interest, which will play a very important part in next year's active business, is the main cause of delay at present. Vessel men hope, of course, to get a season freight of \$1.25 on ore from the head of Lake Superior next season, and some of the ore men admit that such a figure may be paid, but they say there is nothing to be gained in talking of a rate of any kind when there are no negotiations for sales of ore under way.

The two-dollar ore rate and 6-cent grain rate from the head of the lakes, which still prevail, have reduced ore shipments so that the total output will not be greatly above 9,000,000 gross tons. This reduction in output will, however, tend to increase the shortage of Bessemer ores, which seems certain to occur before the opening next spring. It will strengthen conditions for next year, and probably help to bring about a movement of 12,000,000 tons or more of ore next season, as all of the mining companies are acquiring new leases, especially on the Mesabi, and the ore railways in the Lake Superior region are buying new cars and new locomotives, and are increasing their equipment and dock facilities generally in preparation for very heavy shipments.

Ship Yard Matters.

If directors of the Flint & Pere Marquette Railway decide to build a steel car ferry on the plans that have been submitted to several lake builders for proposals, the vessel will probably cost \$275,000. It is understood that the company really intends to build two ferries, but the directors will be governed, of course, by bids that will be received on the preliminary plans. The plans call for a vessel suited to the service between Manitowoc and Ludington, at both of which places preparations have been made for extensive terminals. F. W. Wheeler & Co., the Globe Iron Works Co. and the Detroit Dry Dock Co. are all looking for the contract. The designs, which were prepared by Robert Logan of Cleveland, are for a vessel with four tracks capable of carrying thirty loaded cars. The steamer will be entirely housed in. There will be no open space aft, as is the case with all other ferries on the lakes. As the service will involve trips through heavy ice during the winter season, frames and other parts will in some cases be double the weight of similar parts in an ordinary steel freight steamer. The dimensions are 350 feet keel, 56 feet beam and 20 feet depth. Three compound engines, two aft and one forward, each having cylinders 24 and 48 by 36 inches, will take steam from four single-ended boilers of 13 feet 6 inches diameter and 12 feet length. There will be three 42-inch furnaces, and the boilers are to be of 140 pounds working pressure. This machinery will develop about 3,000 horse power.

Capt. John Mitchell, who has had considerable to do with the management of the Centurion, figures that the flour and copper thrown overboard when this big steel vessel was ashore at Isle Royale was worth about \$155,000. This is figuring the copper, of which there was about 525 tons, at 11½ cents a pound, and the flour, of which there was about 1,000 barrels, at \$3 a barrel. The Centurion goes into dock at the American Steel Barge Co.'s plant, West Superior, and although there are ample facilities at this yard for rushing work on her, it is not probable that she will handle much freight during the balance of the present season. Repairs to the vessel and wrecking claims will undoubtedly bring the loss to a figure that will make it the heaviest of the season, notwithstanding efforts that are being made to recover as much as possible of both the copper and the flour. Nearly all of the insurance companies doing business on the lakes will bear a portion of this loss, as most of them are involved in either hull or cargo, but companies represented by Smith, Davis & Co. of Buffalo are the heaviest losers, as that firm is said to have placed an even hundred thousand on the hull. Preparations are being made at West Superior to do considerable repair work on such of the whalebacks as will winter at the head of the lakes, so that the barge company's plant will be kept quite busy until spring.

Gen. Mng'r. Wallace of the Cleveland Ship Building Co. has been in Duluth during the past week in consultation with Mr. A. B. Wolvin regarding the big freight steamer which the Cleveland company is building for the Zenith Transportation Co. Mr. Wolvin is not as yet fully

decided as to boilers for this steamer. He may put in Babcock & Wilcox tubular boilers, the same as are in use in the Zenith City. Mr. Wallace is also arranging with Capt. Alex. McDougall some details regarding the triple expansion engines which the Cleveland company is to build for the whaleback steamer that is to be constructed at West Superior during the winter.

A loss of about \$36,500 must be settled as a result of the steamer Robert L. Fryer's injuries through being sunk in the Sault river after her collision with the Mutual line steamer Corsica. About \$25,500 will be required to cover injuries to the hull, \$3,000 for loss on machinery and \$8,000 for raising the vessel. The Fryer is in one of the docks of the dry dock company, Detroit, and repairs on her will be hurried. Smith, Davis & Co. of Buffalo sustain a loss of about 60 per cent. of this risk and the balance is divided between Worthington & Sill, David Vance, C. W. Elphicke & Co. and C. A. Macdonald & Co.

It was expected that the REVIEW would be enabled to present in this issue drawings of the steel steamer and steel steam yacht under contract at the works of the Union Dry Dock Co., Buffalo, but they must be left for a future issue. In addition to work on these vessels, Manager Gaskin of the Union company has under way the enlargement of one of his docks to 400 feet length, 55 feet width at the bottom and 100 feet at the top, and 17½ feet depth.

Triple expansion engines and boilers for the big freight steamer under construction at the yard of the Globe Iron Works Co., Cleveland,—the boat which will be larger by several feet than any of the 400-foot ships,—are being taken apart for removal to the ship yard, but work on the hull is not so well advanced. There is, of course, no great hurry in getting the vessel out, as there is no thought of having her go into commission until next season.

John Corrigan of Cleveland is figuring with some of the builders for another steel tow barge, similar to his Aurania, built recently by the Chicago Ship Building Co. It is probably the intention to have the proposed new vessel tow with one of the vessels of the James Corrigan fleet.

A harbor tug 57 feet long was launched Monday from O'Neill's ship yard, Port Huron. She is named F. J. Haynes and is intended for service at Port Huron.

Lightering of Cargoes in Canadian Waters.

Editor MARINE REVIEW: When the steamers John Craig and S. S. Curry went aground on Ballard's reef on their last trips from Duluth, each one lightered part of her cargo onto lighters, towed the lighters to a dock at Amherstburg, and reloaded there. This has caused considerable trouble with the customs authorities, as the cargo being lightered in Canadian waters, and reloaded from lighters in Canadian waters, is treated by them the same as if it had been taken into a Canadian warehouse and then re-shipped to the United States. Bonds have to be made out and entries made, necessitating a great deal of trouble and annoyance to avoid the payment of duties, whereas if the lightered grain had been reloaded in American waters this trouble would have been avoided. We would ask you to kindly make this matter public for the information of the vessel masters and others interested, as it may some times save trouble and annoyance to all concerned.

BROWN & Co.

BUFFALO, N. Y., Nov. 7, 1895.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store at the principal points of accumulation on the lakes on Nov. 2, 1895:

	Wheat, bushels.	Corn, bushels.
Chicago.....	18,601,000	1,102,000
Duluth.....	5,568,000
Milwaukee.....	557,000
Detroit.....	495,000	32,000
Toledo.....	980,000	183,000
Buffalo.....	1,868,000	358,000
Total.....	28,067,000	1,675,000

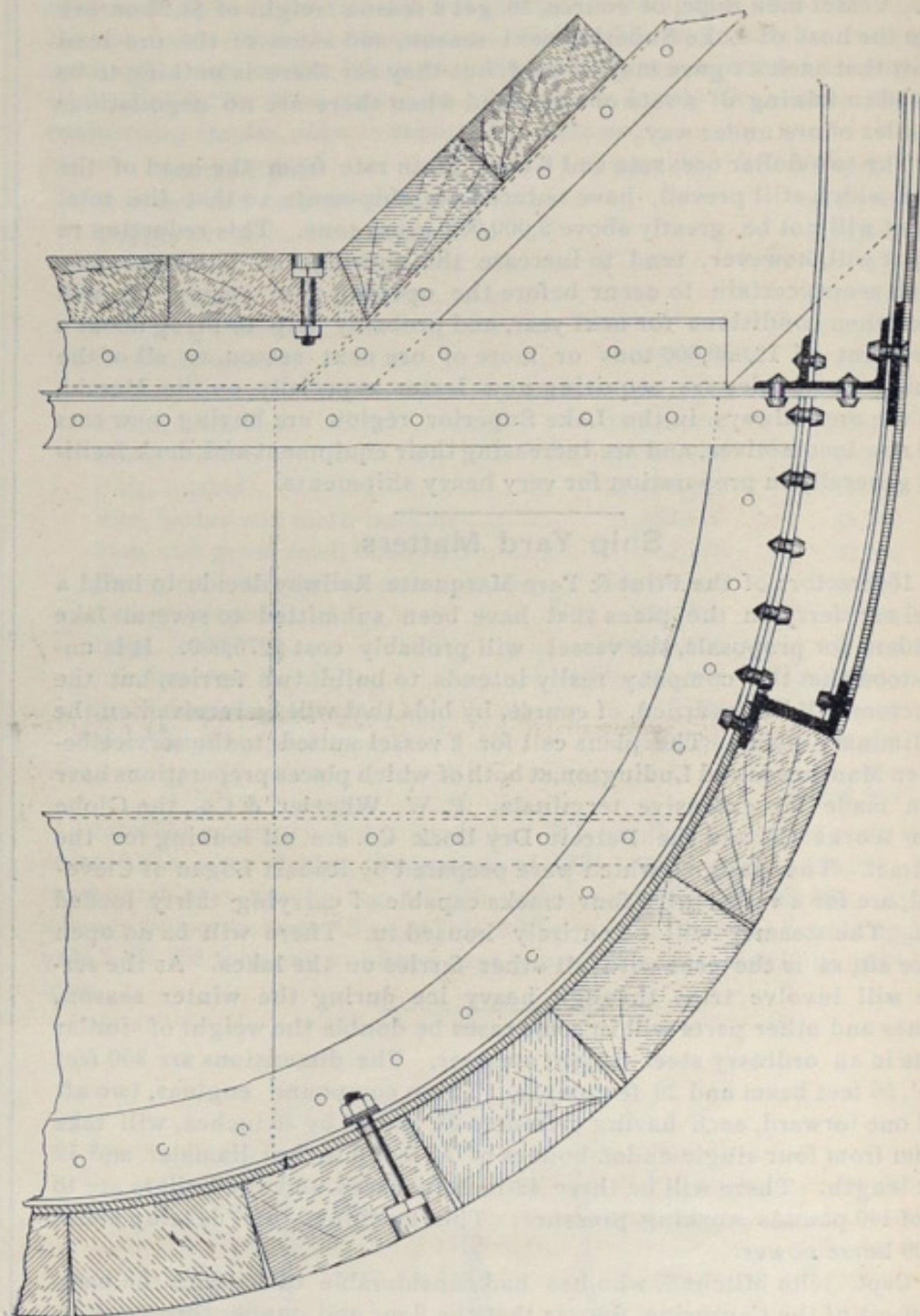
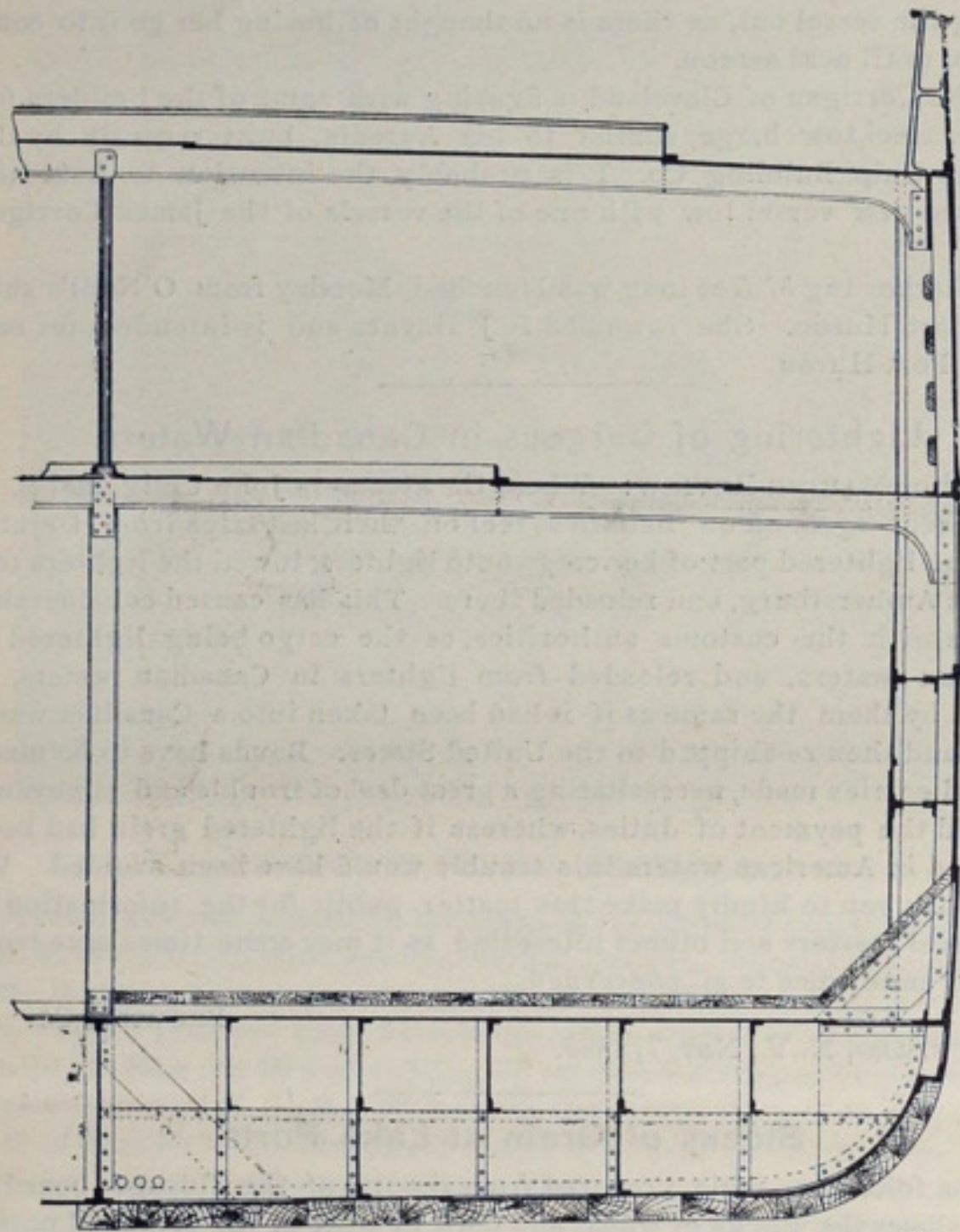
As compared with a week ago, the above figures show at the several points named an increase of 1,390,000 bushels of wheat and a decrease of 294,000 bushels of corn.

Lewis Nixon of Elizabeth, N. Y., will build a steel ferry boat, 168 feet long, for the Pennsylvania Company for service in the Delaware river between Camden, N. J., and Philadelphia. At the Nixon yard there is also under construction a steam yacht for P. B. Widener of Philadelphia. The vessel is schooner rigged, and is 183 feet on the water line, 28 feet beam and 12 feet draught. Her engines are triple expansion, of about 1,300 horse power, with cylinders 18, 27 and 42 inches diameter by 28 inches stroke.

Another Kind of Composite Bottom.

George F. Williams of West Bay City, Mich., who was for a number of years engaged with F. W. Wheeler & Co., ship builders, and who has of late been employed as an expert in the examination and classification of vessels for the Inland Lloyd's Register of Shipping, has applied for letters patent on a composite bottom for metal ships, which is illustrated in accompanying engravings. As in all cases where wooden sheathing is used for bottoms of lake vessels, the first advantage claimed is additional strength to the metal plates, thereby stiffening the entire bottom, and the sheathing acting as a fender when coming in contact with rocks or other hard substances so frequently met with in shallow channels. In this case the use of the Z bar, as shown in the drawings, is regarded of special advantage. First, it is claimed that as the wood sheathing is flush with the metal plates, friction is reduced to a minimum. It is further claimed that the lapping of the top angles over the floor angles and the use of the Z bar to connect the outer and inner plating, make a strong and safe connection between the upper and lower sections. Ships constructed

a burden upon the whole. Aside from the advantages our government and people would obtain from the construction of ships of war on the lakes, the most important thing would be the interest aroused in naval matters among the people of the northwest. The value of patriotic interest in such matters can not be over-estimated. It would be of the greatest value to this government in its endeavors to reconstruct a formidable navy. The people living in the great cities bordering on the lakes little appreciate how utterly defenseless these cities are. Charles Cramp, the great Philadelphia ship builder, is authority for the statement that the Clyde-built ships of the Canadian Pacific railway are built with a view to use in case of war, and that they actually have gun platforms constructed and guns ready to be mounted on the shortest notice. Thus an expedition could be fitted out in case of war with England with these ships at Owen Sound in Georgian bay, to operate against the lake cities of Chicago, Milwaukee and other cities on Lakes Huron and Michigan. Likewise, an expedition could be fitted out at Port Arthur, on Lake Superior, to operate against the cities of Duluth, Superior, Marquette and



COMPOSITE BOTTOM FOR STEEL SHIPS—DESIGN BY GEO. WILLIAMS, WEST BAY CITY, MICH.

after this plan will not, Mr. Williams says, suffer a reduction in speed as is the case where the angles and sheathing project outside the shell plating.

The principal claims made in the letters patent covering this system of construction are for the outer metal covering, the Z shaped bar connected to each part of the covering and joining the same, and the wooden sheathing covering the entire bottom of the vessel and having its exterior flush with that of the offset metal covering.

Abrogate the Treaty.

Editor MARINE REVIEW: At last Americans are awakening to the necessity of abrogating the treaty with England, which prevents the construction and maintenance of ships of war on the lakes. This treaty, besides being unfair to lake ship builders, prevents the government from obtaining low figures for construction by competition between the builders on the coast and on the lakes. The bid of the Detroit Dry Dock Co. was much the lowest for constructing the new small cruisers, but was rejected on account of this treaty. The ship yards on the lakes are as well equipped to construct any class of vessels as those on the seacoast and the government should not create a monopoly for the ship builders on the coast when it has the power to prevent such monopoly by annulling this treaty. It is a great injustice to one section of our country and

other Lake Superior ports. And what preparations has the United States made to meet these contingencies? None whatever! True, we have the old Michigan, mounting four thirty-pounders, but this ship is only an expense to the government and of no possible value except to excite the ridicule of the people. We have no ships on the lakes built under government supervision with a view to use in time of war. Although we have hundreds of modern steel vessels, they are of no use without guns, to be placed on board for immediate use, to meet those Canadian vessels.

There is no possible excuse why the cities on the lake coasts should not have equal protection with the cities on the seaboard. Look at the great cities of Chicago, Milwaukee, Cleveland, Buffalo, Duluth, etc., utterly defenseless. A hostile fleet could lay in the open lake and shell these magnificent cities with perfect impunity. It is almost criminal to allow this state of affairs to continue.

We have not a ship on the lakes able to meet the little, quick maneuvering Canadian ram Petrel. It is indeed high time to assert our independence on these lakes. We should have a sufficient naval force to protect our vast lake commerce and insure our lake cities from destruction. Let us again hear the cry "Millions for defense but not one cent for tribute." The duty of the hour is to abrogate this treaty, obnoxious to the whole northwest.

Detroit, Mich., Nov. 5, 1895.

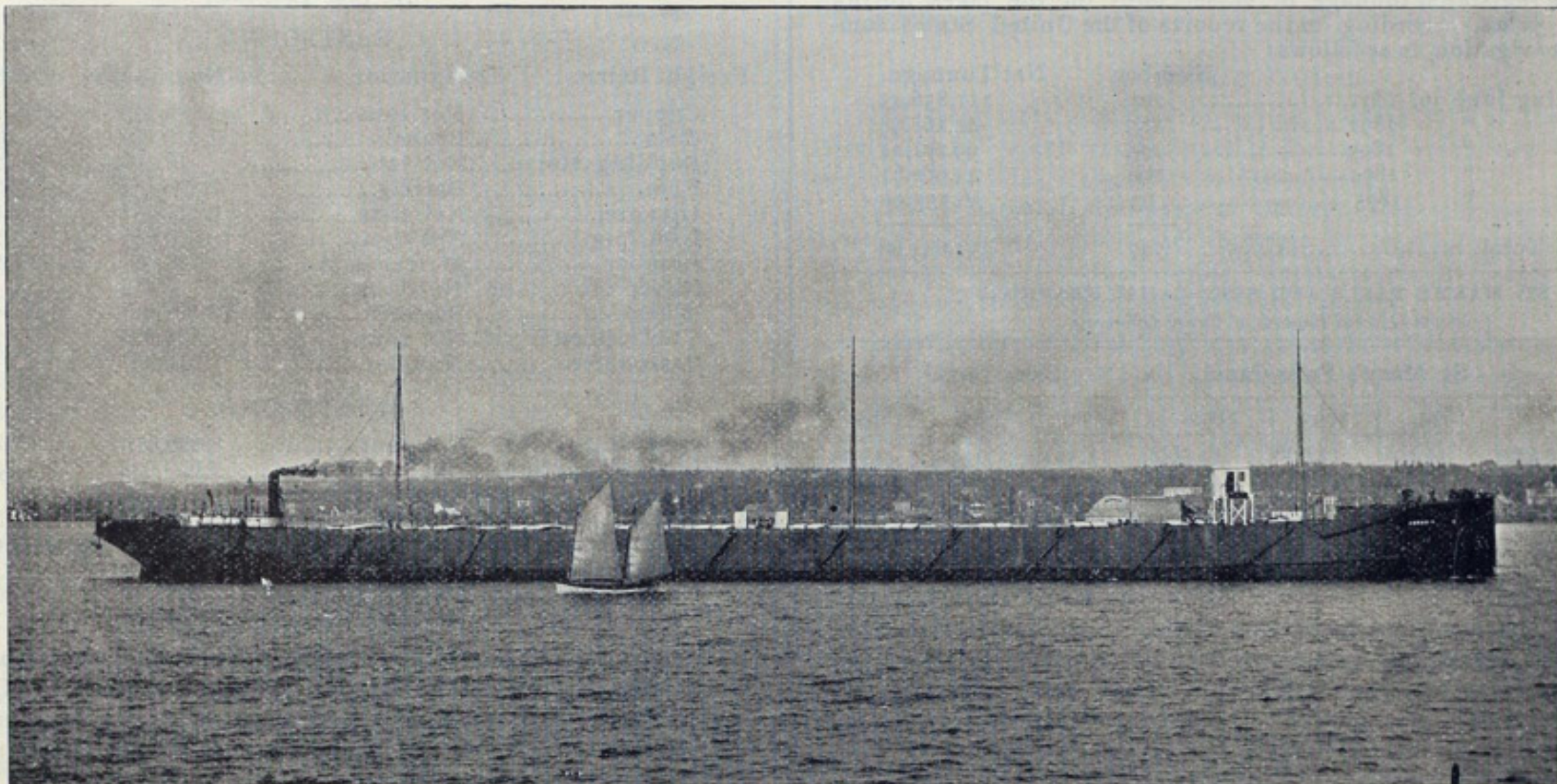
RICHARD P. JOY.

Novel and Powerful Dredging Steamer.

A hydraulic hopper dredging steamer named Gen. C. B. Comstock, which has just been accepted by the government for work on the bar at Galveston, Tex., was built by a lake firm, the Bucyrus Steam Shovel & Dredge Co. of South Milwaukee, Wis., and is one of the most complete examples of a vessel of her type ever constructed in this country. A large number of dredging steamers of this kind have been built in England and on the Clyde but there are none of them in use on the lakes.

The works now being carried out at Galveston, under the supervision of Maj. A. M. Miller, of the United States engineer corps, have for their object the creation of a deep water port, and one of the first and principal necessities was the deepening of the bar which obstructs the entrance to the bay on which the city of Galveston is situated. For a long time this bar has restricted the draught of water of vessels entering the harbor to 10 or 12 feet. The formation is a very fine, hard, white sand and a considerable improvement has been effected by the construction of jetties, so that the ebb and flow of the tide between the jetties helps to create and maintain a deep channel. The action of the tides, however, was insufficient to accomplish the result, and in order to hasten the work it became necessary to dredge the bar. The dredging of ocean bars presents a set of conditions entirely different from those met with in ordinary dredging, and a special type of dredging vessel has been developed to meet these conditions. Owing to the exposed situation and the conse-

each boiler having two Fox corrugated furnaces. Immediately forward of the boilers is the pump room. Here are located two independent centrifugal dredging pumps each driven by compound direct connected engines of 125 horse power. Each pump has 15 inches suction and discharge and is especially designed to withstand the abrasion and wear of the sand for the greatest length of time, and to give freedom of flow through the passages. The blades of the runner are of steel and are removable through a man-hole in the casing. There is a thrust bearing on the shaft of the multiple collar type, and an intercepting pressure chamber provides for the exclusion of the sand from pump shaft bearing. The cranks are balanced and the engine runs smoothly and steadily at 200 revolutions, but in ordinary work the speed is about 185 revolutions. The suction pipe enters through the side of the boat just above the load water line. There is a heavy flanged socket casting fitted into the side of the vessel which receives the swivel elbow of the suction pipe. This elbow is a steel casting and has sufficient length of bearing in the socket to hold it in place and take the entire strain of the suction pipe without any additional support. The stuffing box for the elbow is inside the boat and easy of access from the pump room. The suction pipe is 50 feet long in two sections and made of wrought iron welded tubing. There are two flexible connections in the pipe to permit freedom of movement in a seaway under all conditions. The drag at the lower end of the suction pipe is of cast iron and so arranged that if it should encounter any



STEEL TOW-BARGE AURANIA, BUILT BY CHICAGO SHIP BUILDING CO. AND OWNED BY JOHN CORRIGAN OF CLEVELAND.
Capacity 3,931 gross or 4,402 net tons on draught of 14 feet 4 inches. Dimensions—352 feet keel; 365 feet over all; 44 feet moulded beam; 26 feet moulded depth.

quent necessity of working in considerable sea-way, it is impracticable to use anchorages of any kind, or to load the material into scows alongside. The type of dredge, therefore, becomes a self-propelling hopper steamer, equipped with centrifugal dredging pumps, which pump the sand from the bar while the vessel is being slowly steamed over it; the sand being received into the hoppers in the hold of the vessel and discharged at sea through valves in the bottom.

The hull is of wood, 177 feet long over all, 35 feet 6 inches beam and 16 feet hold, and the two hoppers have a collective capacity of 500 cubic yards when filled to level of main deck. They can, however, be filled considerably higher than this as they are surrounded by a coaming 33 inches high. There is a full equipment of everything that goes to make up a seagoing vessel, such as Providence steam windlass, Westinghouse electric light plant, Huntington search light, etc. Pilot house and bridge forward, with commodious quarters for officers and crew over the hoppers, and two masts fitted with derrick booms for handling suction pipes and machinery, give this dredger the appearance of an ordinary steam vessel. The builders have even gone further and provided awnings for both forward and after decks to meet conditions prevailing in the warm climate in which the vessel will be engaged. The vessel was built from designs of A. W. Robinson, M. Am. Soc. of C. E., who also designed the pumps, pumping engines and dredging equipment. These latter were built by the South Milwaukee concern, which sub-let the contract for the hull to Hugh Ramsay of Perth Amboy, N. J., and the contract for propelling machinery to Neafy & Levy of Philadelphia.

The propelling engines drive the vessel at a speed of ten miles per hour when light and eight miles per hour when loaded. Steam is furnished by two marine boilers, 10 feet in diameter by 11 feet 6 inches long,

immovable obstruction it will raise up and pass over it automatically without unduly straining the suction pipe. The suction pipes are suspended on each side from two steam cranes with wire rope hoisting tackle, by means of which they are readily raised or lowered to the required depth. A spring indicator on the crane shows the tension of the ropes and the degree of pressure of the drag upon the bottom. The drag is furnished with removable steel cutting blades. From the pumps the discharge is carried forward over the hoppers in two large troughs which have openings or slides at suitable intervals so that the material can be properly distributed in the hoppers. The discharge of the pumps consists of a mixture of sand and water, the percentage of sand varying from 10 to 40 according to circumstances. The water overflows from the hoppers through suitable openings, passing over the deck, while the sand precipitates in the hoppers. During the trial the hoppers were filled with water only in 4½ minutes with both pumps running. This is equal to a capacity of 11,000 gallons per minute for each pump. The time occupied in opening the valves and discharging the load is 7½ minutes.

Col. John H. White of Ashland, Wis., who was in the service of the government during the early days of navigation on Lake Superior, and who is now one of the leading men of that town, writes Capt. Thomas Wilson of Cleveland as follows: "I want to find William L. Hance, if he is living. Back in the last of the fifties he lived up here; afterwards he became a sailor and was wheelsman the last trace I got of him, on some lake vessel. It is possible, if you do not know of him, that you can refer this letter to some of those who sailed on the lakes during the days of the Meteor and earlier lake vessels."



DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 516 Perry-Payne building, Cleveland, O
SUBSCRIPTION—\$2.00 per year in advance. Single copies 10 cents each.
Convenient binders sent, post paid, 75 cents. Advertising rates on application.

The books of the United States treasury department on June 30, 1895, contained the names of 3,342 vessels, of 1,241,459.14 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1894, was 359 and their aggregate gross tonnage 634,467.84; the number of vessels of this class owned in all other parts of the country on the same date was 316 and their tonnage 642,642.50, so that half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1895, was as follows:

Class.	Number.	Gross Tonnage.
Steam vessels.....	1,755	857,735.00
Sailing vessels.....	1,100	300,642.00
Unrigged.....	487	83,082.00
Total.....	3,342	1,241,459.00

The gross registered tonnage of vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30,	Number.	Net Tonnage.
1891.....	204	111,856.45
1892.....	169	45,168.98
1893.....	175	99,271.24
1894.....	106	41,984.61
1895.....	93	36,353.00
Total.....	747	334,634.28

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.
(From Official Reports of Canal Officers.)

	St. Mary's Falls Canal.			Suez Canal.		
	1894.	1893.	1892.	1894.	1893.	1892.
No. vessel pass'ges	14,491	12,008	12,580	3,352	3,341	3,559
T'n'ge, net registd	13,110,366	9,849,754	10,647,203	8,039,106	7,659,068	7,712,028
Days of Navigat'n	234	219	223	365	365	365

Entered at Cleveland Post Office as Second-class Mail Matter.

THERE is absolutely no foundation at this time for the story that John Gordon is organizing a company to build a couple of passenger steamers for service between Buffalo and Detroit. F. P. Gordon, who was assistant general manager of the Northern Steamship Company, made up some figures, several months ago, on the possibilities of such a line, but no attempt was made to form a company. It can be said, however, that the Messrs. Gordon have considered quite seriously the question of building passenger vessels for service between Buffalo and Chicago and Milwaukee. Such a line would come into direct competition with the big Northern ships. It is claimed that fast ships, with no Sault river and no canal to detain them, could not only build up a big business between Buffalo and Chicago, but could land passengers in Minneapolis and St. Paul, by way of Milwaukee, in a great deal less time than is required by the Northern line ships for this service.

VERY good dispatch is given to vessels taking coal to Sheboygan, Wis., this season. There is now 17 feet of water in the harbor. The C. Reiss Coal Co. is deserving of a great deal of credit for the manner in which they have increased the facilities for handling coal at Sheboygan. They now have three docks, one of which is devoted exclusively to soft coal. The City of Naples was recently unloaded at this firm's dock in eighteen hours. She had a cargo of 2,476 tons. The City of Genoa, which followed the Naples with 2,507 tons, was unloaded in fourteen hours. This is certainly good dispatch for a Lake Michigan port.

ON ACCOUNT of great rivers and other bodies of inland water in this country to be crossed by railways, American bridge engineers have become the leaders of the world in their specialty. For the same reason the development of the car ferry, almost unknown in any other country, has been very marked here. There is a great future for ship builders in the construction of craft of this kind.

WHATEVER may be said of the failure of vessel owners generally to take kindly to the whalebacks, they are certainly great sea vessels, and Capt. McDougall has reason to point with pride to the fact that they have been out continually during the late series of storms on Lake Superior when other vessels were in shelter.

Lake Superior Business in Coal, Grain, etc.

Light coal shipments are still the most important feature of the reports of both canals at the Sault. It is quite evident that soft coal shippers are determined to have no surplus stocks of coal at the head of Lake Superior when navigation opens next spring. It is even hinted that they would be pleased to see stocks so light this winter that all-rail shipments would be required to some districts that are supplied from Duluth. Such a condition would certainly tend to put up prices for next year. Statements from both the Canadian and the United States canals which are summarized below, show that shipments of soft coal to Nov. 1 are 179,228 tons less than they were on the same date a year ago, while the shortage in hard coal shipments up to the same date amounts to 74,602 tons:

COAL SHIPMENTS TO LAKE SUPERIOR THROUGH UNITED STATES AND CANADIAN CANALS.

	To Nov. 1, 1895.	To Nov. 1, 1894.
Bituminous, net tons.....	1,859,818	2,039,046
Anthracite, net tons.....	354,414	429,016

The movement of wheat through both canals to Nov. 1 shows a gain thus far this season of 2,398,526 bushels. A detailed statement of the combined traffic of both waterways follows:

COMBINED TRAFFIC OF UNITED STATES AND CANADIAN CANALS AT SAULT STE. MARIE—OPENING OF NAVIGATION TO NOV. 1, SEASONS OF 1894 AND 1895.

EASTBOUND.

Freight items.	Designation	To Nov. 1, 1894.	To Nov. 1, 1895.
Copper.....	Net tons.....	85,919	94,251
Corn.....	Bushels.....	1,530,008	688,711
Building stone.....	Net tons.....	20,295	22,835
Flour.....	Barrels.....	7,235,568	7,234,582
Iron ore.....	Net tons.....	6,111,148	7,543,207
Iron, pig.....	Net tons.....	19,663	20,861
Lumber.....	M. feet B. M.....	648,643	695,875
Silver ore.....	Net tons.....	412	100
Wheat.....	Bushels.....	26,502,088	28,900,614
Unclassified fr'ght.....	Net tons.....	134,021	129,704
Passengers.....	Number.....	13,397	16,250

WESTBOUND.

Coal, anthracite.....	Net tons.....	429,016	354,414
Coal, bituminous.....	Net tons.....	2,039,046	1,859,818
Flour.....	Barrels.....	783	2,150
Grain.....	Bushels.....	10,500	35,650
Manufactured iron.....	Net tons.....	28,797	64,559
Salt.....	Barrels.....	174,174	218,908
Unclassified fr'ght.....	Net tons.....	225,115	264,631
Passengers.....	Number.....	13,216	16,818

As the Canadian canal has been in operation all through the month of October, passing 217,696 net tons of freight, the report of the United States canal for October shows a decrease, of course, as compared with the same month last year. The aggregate of freight moved through the United States canal from the opening of navigation to Nov. 1 is 12,781,383 net tons, of which 10,314,558 tons was east bound and 2,466,825 west bound.

In General.

Three American vessels, all schooners and all eighty to ninety years of age, were loaded in Boston last week. They were the Hiram, built in 1813; Polly, built in 1805 and Julia Ann, built in 1816.

Traffic through the new Baltic-North Sea canal, which the German government opened recently with great ceremony, is very far from what had been expected. Vessels of a small class are its principal users, and are mainly those sailing between Hamburg and Kiel. This lack of development in traffic is attributed to the heavy dues charged.

Secretary Herbert, after a conference with Commander Nicoll Ludlow, has decided to appoint a board to consider the matter of Commander Ludlow's recommendations regarding Lieut. Commander Sperry. Commander Ludlow is awaiting promotion, but it has been refused him on the charge that he made conflicting reports regarding the qualifications of Lieut. Commander Sperry as a naval officer.

American ideas, especially those relating to the protection of lives and property, are oftentimes most excellent. After long thinking John Bull grudgingly approves of these ideas and adopts them. The storm warning system of our weather bureau has proved its efficiency so often that it is considered one of the permanent safeguards for shipping on our coasts. It has shown its value so well and has been so much commended by shipping people that now Great Britain is going to adopt the same system and through its meteorological office in London will henceforth exhibit storm warning signals at various points on its coasts.—Maritime Register, New York.

MASTERS OF LAKE VESSELS CAN NOT WELL AFFORD TO BE WITHOUT THE NEW CHARTS. EXAMINE THEM AT THE OFFICE OF THE REVIEW.

Wages on Lake Vessels.

More changes in wages have been made by the Lake Carriers' Association, taking effect Nov. 1. In the following table the extreme wages established by the new schedule are compared with the extremes of Oct. 15, 1894, the date on which the last advance of the season was made a year ago. Wages this year show, of course, material advances:

WAGES ON LAKE VESSELS—1894 AND 1895

ON STEAMERS:	Wages per month, card of Oct. 15, 1894.	Wages per month, card of Nov. 1, 1895.
FIRST CLASS—Metal steamers having water bottom and triple expansion engine:		
Chief engineer.....	\$100 00	\$100 00
Second engineer.....	70 00	75 00
SECOND CLASS—Metal steamers not included in the first class and wooden vessels with triple expansion and with compound engines, except the smaller boats, which may be put in the third class:		
Chief engineer.....	90 00	100 00
Second engineer.....	60 00	65 00
THIRD CLASS—Smaller boats with high pressure or low pressure engines, or with compound engines, covering all boats not included in the two former classes:		
Chief engineer.....	75 00	85 00
Second engineer.....	50 00	55 00
First mates.....	70 00	80 00
Second mates.....	50 00	55 00
Cooks.....	50 00	55 00
Helpers to cooks.....	15 00	20 00
Firemen.....	37 50	45 00
Wheelmen.....	37 50	45 00
Lookouts.....	37 50	45 00
Deck hands.....	20 00	25 00
Oilers.....	37 50	45 00
ON CONSORTS AND SAILING VESSELS:		
First mates.....	50 00	60 00
Second mates.....	40 00	50 00
Cooks.....	37 50	45 00
Seamen.....	37 50	45 00
Boys.....	20 00	25 00

Wages of firemen helping in laying up vessels have been fixed at \$1.50 per day.

Cure for Hot Bearings.

The marine engineer who has not had trouble with hot bearings would be a curiosity. R. L. Peck, who was in the Owego and vessels of the Minnesota fleet, and who is now chief engineer of the Manitou, gives the following experience when in the Owego: "Magnolia metal was used in the low pressure crank pin brasses, 14 inches diameter, 16 inches long. It was placed at quite a disadvantage. Post's zero had melted out the first trip used in this bearing, and it was well cut up on the surface; was in a great hurry and did not have time to run the Magnolia metal as I should like to have done. The first trip to Buffalo, August 1, intentionally let the bearings run loose, and there was a great deal of pounding upon the Magnolia metal. Took this precaution because Post's metal had melted. Expected to see the Magnolia metal all used up upon examination in Buffalo, but was surprised and gratified that such was not the case. Keyed the brasses up, and the chill did not leave the brasses, although we encountered weather that would lift the propeller wheel out of the water." It will also be remembered that this is the same kind of metal used on the steam yacht Wadena on her Atlantic-Mediterranean cruise, and it gave the best of satisfaction. A pamphlet bound with silk cord will be mailed to engineers sending name and address to Magnolia Metal Co., 74 Cortlandt street, New York.

Around the Lakes.

Iron ore receipts at South Chicago to Oct. 31 aggregated 1,635,088 gross tons.

About \$85,000 for the entire ship is the basis upon which J. C. Gilchrist and others of Cleveland secured a controlling interest in the steamer C. W. Elphiche.

In one day of ten hours this week the car dumping machine on the Nypano railway dock, Cleveland, handled 159 cars of coal. On another occasion 101 cars were handled in six hours.

Directors of the Cleveland and Buffalo Transportation Co. have finally decided definitely upon the name City of Buffalo for the side-wheel steamer that is being built at Detroit.

Grain receipts at Buffalo during October aggregated 20,077,590 bushels. In October, 1894, the total receipts were 15,031,104 bushels. The re-

ceipts of the year up to Nov. 1 are 84,586,310 bushels. Last year the receipts previous to Nov. 1 were 83,440,500 bushels. Including flour, the receipts have been for the month 26,965,040 bushels, and for the season thus far 116,549,810 bushels.

A supplement to the Inland Lloyd's Register for November was not generally issued. Only a few copies were printed for the general agents of insurance companies, as there were only two new vessels, the steel lumber carrier Katahdin, owned by McCormick and others of Bay city, and which is given a valuation of \$110,000 and a rating of A1st; and the Simon J. Murphy, a duplicate vessel owned by the Murphy Lumber Co.

The Independent Tug Line of Chicago, always on the alert to advance the interests of its patrons, has purchased the powerful tug C. M. Charnley and placed her in commission. The constant changing of the conditions of the river, low water and the increase in tonnage makes it an absolute necessity to have tugs powerful enough to meet those requirements. Having heretofore had the power of the river this additional increase of up to date tugs will be appreciated by its patrons.

Advance copies of the hydrographic office chart of Mohawk bay, Lake Erie, have been received. The information from which this chart has been made is exceedingly meagre in detail, and it is the desire of the office that the opinions of the masters familiar with that portion of Lake Erie be gotten, so that it may be determined whether or not it is advisable to issue the chart generally. Captains are requested to call and inspect this chart at the branch hydrographical office, 912 Arcade, Cleveland.

Trade Notes.

The large steel steam yacht which is being built at the Erie Basin, New York, and which was designed by J. Beavor Webb, is for C. B. Borden of the firm of Bliss, Fabyan & Co., New York.

The H. Channon Company of Chicago, has sold three of Rylands Bros.' English galvanized steel hawsers to the Chicago Ship Building Co. and has sent two others to the Atlantic coast, this latter order making four sold to go to the seaboard this summer.

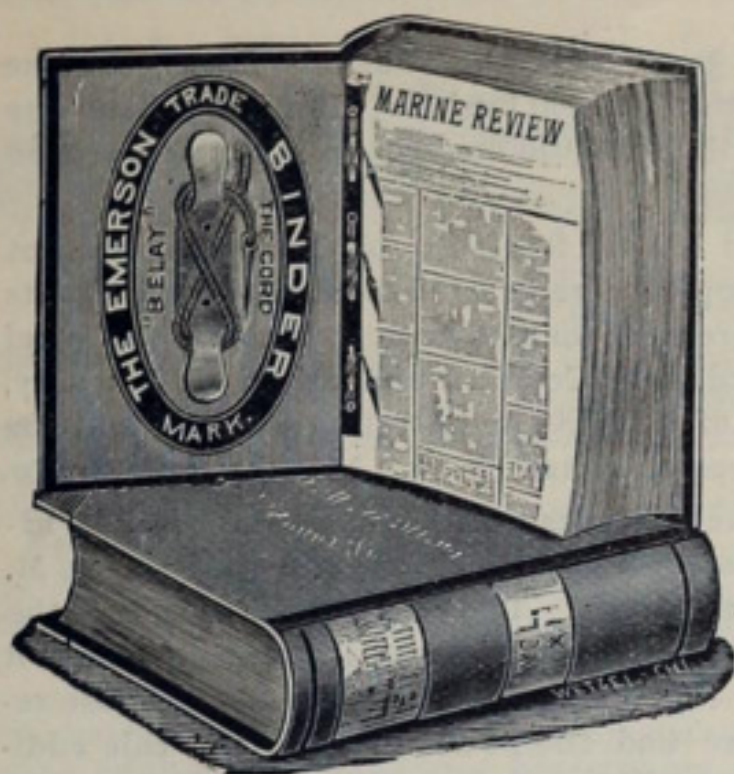
The Cramps of Philadelphia have another contract for a merchant vessel. They have just received an order from the Southern Railroad Co. for a steel passenger steamer 242 feet long. The vessel will have accommodations for 100 first-class passengers in addition to a large amount of package freight.

A catalogue issued by Henry R. Worthington, New York, for circulation at the Atlanta exposition, contains a dozen or more pages of illustrations and information about marine and mining pumps that is of special interest to readers of the REVIEW. At the Atlanta exposition Worthington pumps are used for the water supply of the grounds and for the electric fountains, and the Worthington exhibit is of a most important kind as it has been at all big expositions for a number of years past.

Parties who furnished the steel wire hawser for the schooner Tyrone were considerably exercised over the original dispatch from the Sault on the occasion of her late accident. This telegram stated that the hawser parted, in consequence of which the vessel went ashore. Later dispatches stated that the hook by which the hawser is attached to the steamer gave way and that the hawser itself had not parted, nor was it seriously injured, although it had met with hard scraping from the keel of a schooner which ran across it previously. They have now on hand the original certificate of test of this hawser, which shows that each wire on being tested had withstood the tensile stress at least equivalent to that set forth in table No. 22 in rules of Lloyd's register of shipping, and that the aggregate strength of the wires was not less than 10 per cent. in excess of those requirements; also that each wire had been twisted eight times around itself as a core and untwisted again without fracture. It is scarcely conceivable that a wire rope made upon this principle could give way under ordinary or even extraordinary strain. So much in excess are these admiralty ropes of the actual requirements of the sea, that it is to be expected, upon the face of the matter, that something else than the wire will give way, which in the above instance proved to be the case.

The navy department refuses to give out for publication the reports of tests recently made of Scotch boilers in the lake steamer Victory and Babcock & Wilcox water tube boilers in the Zenith City, which are duplicate ships, but it is understood that as a result of the investigation one of the twin-screw gunboats which the Union Iron Works of San Francisco will build will be equipped with the Babcock & Wilcox boilers, and that two of the four single-screw gunboats to be built on the Atlantic coast will be likewise supplied, thus affording a good opportunity for exhaustive comparative tests of the two types of boilers in actual naval service.

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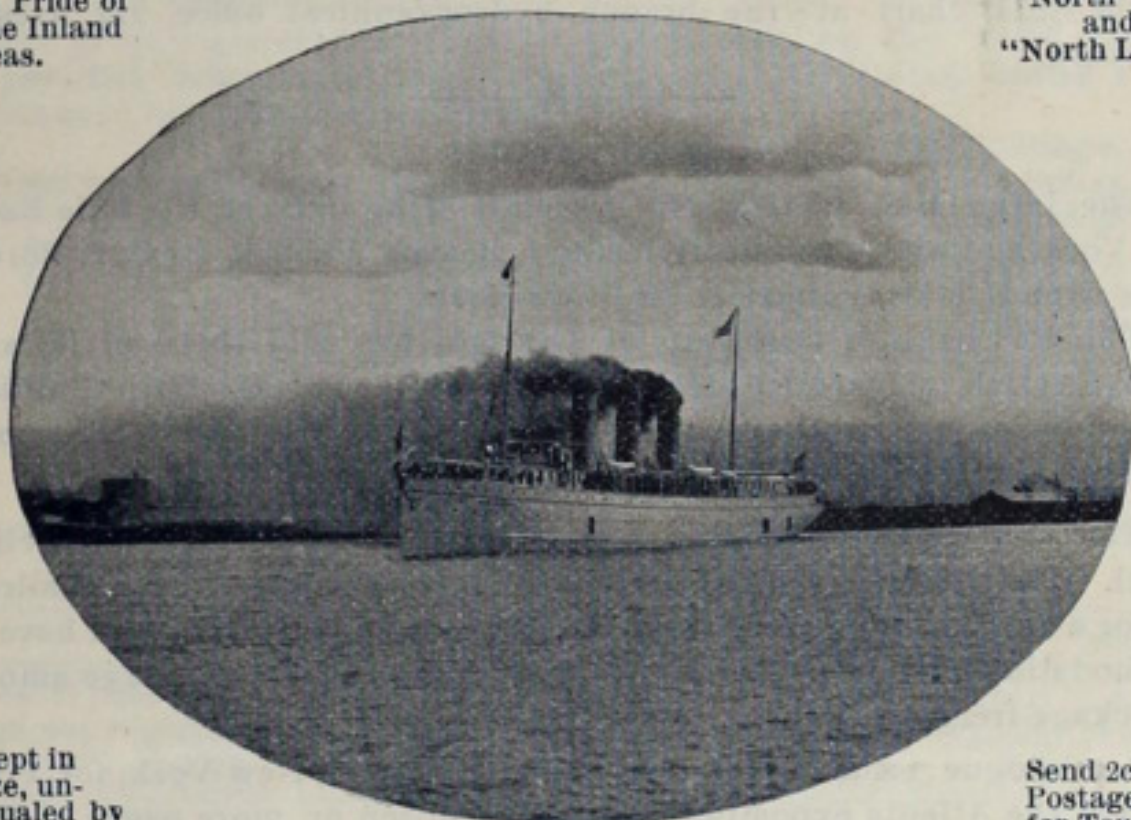
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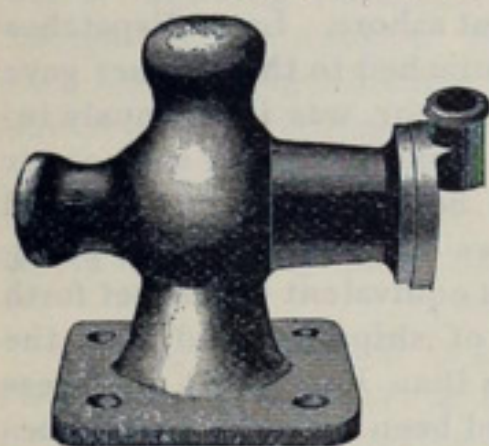
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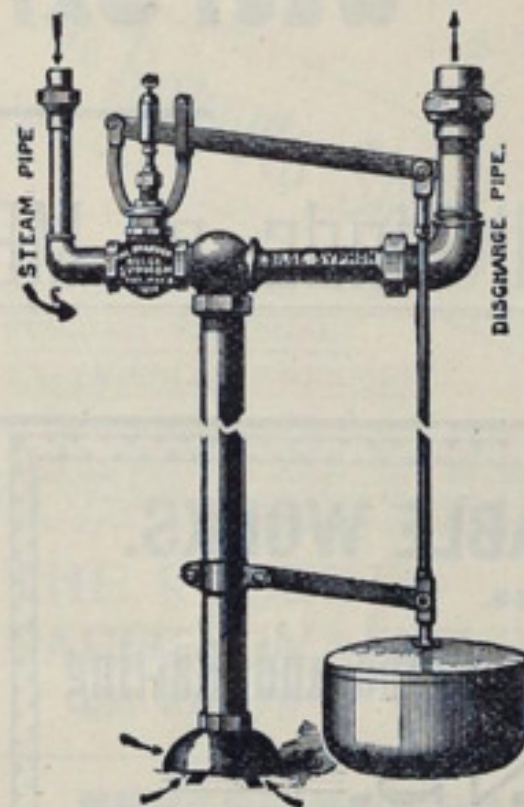


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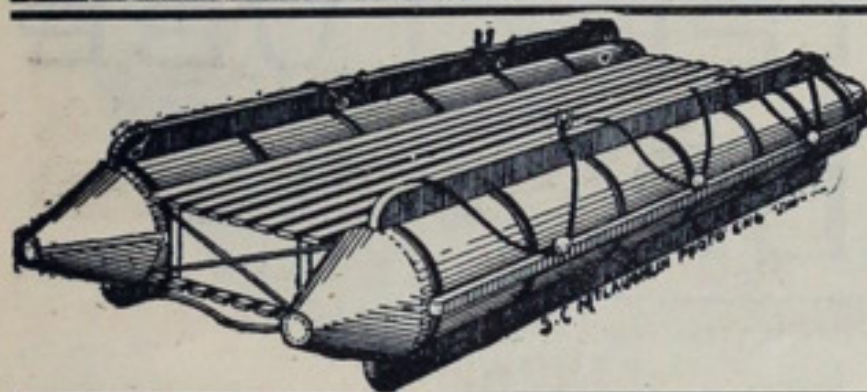
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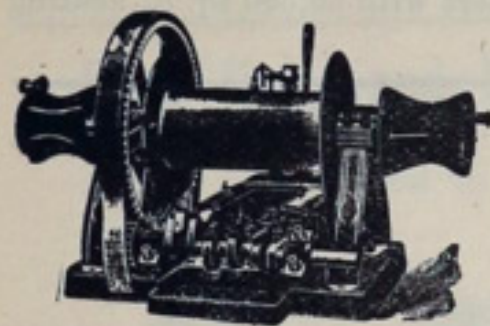
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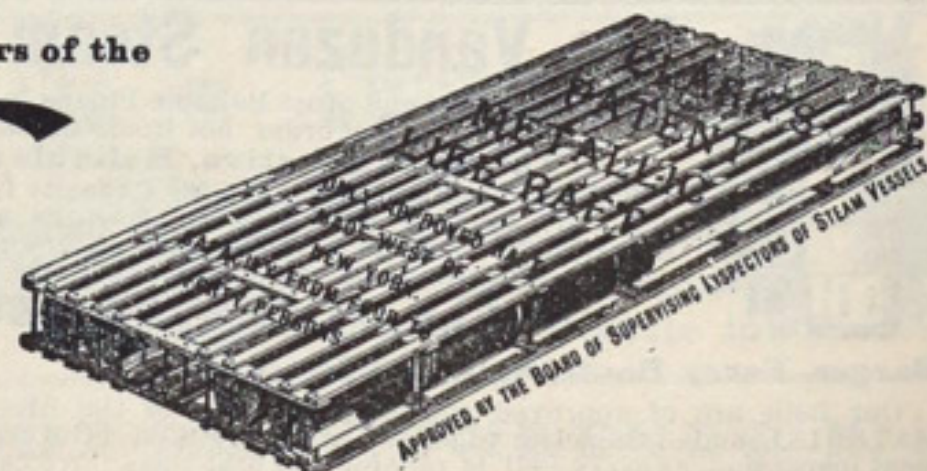
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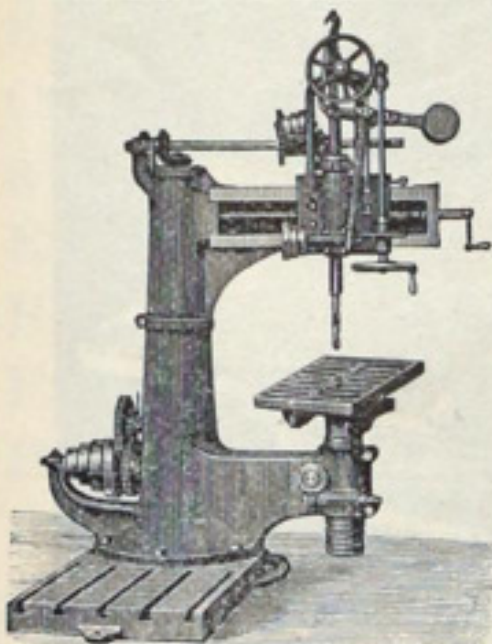
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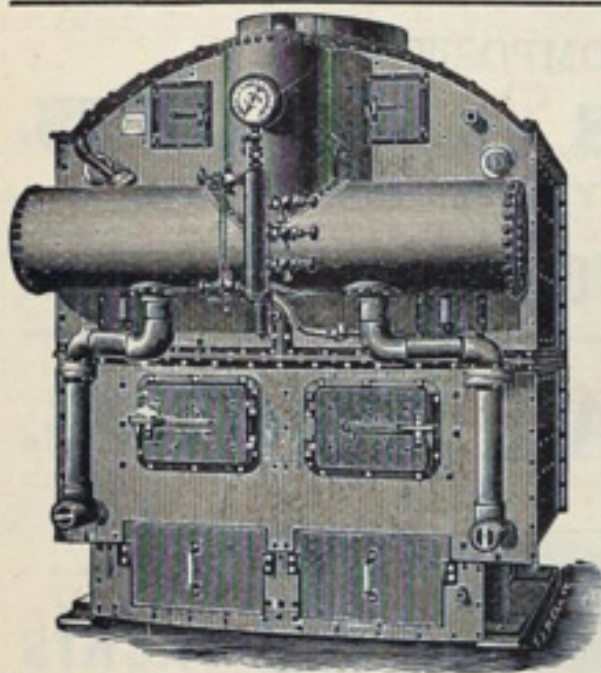
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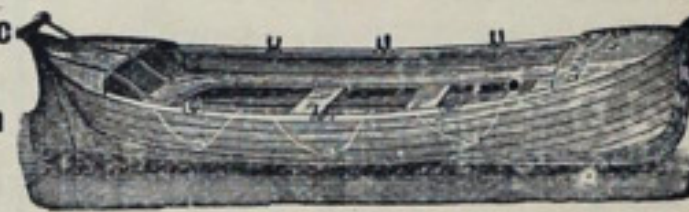
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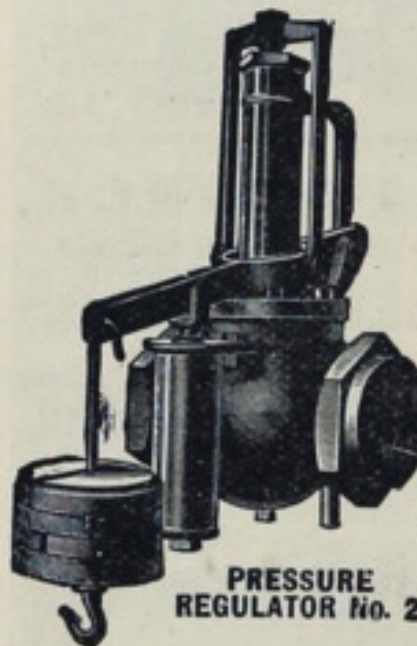


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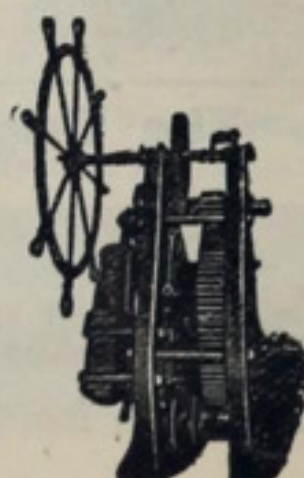
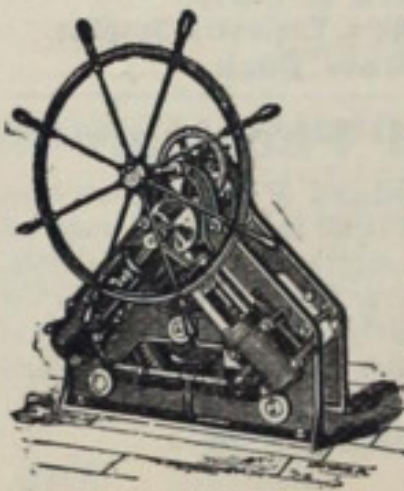
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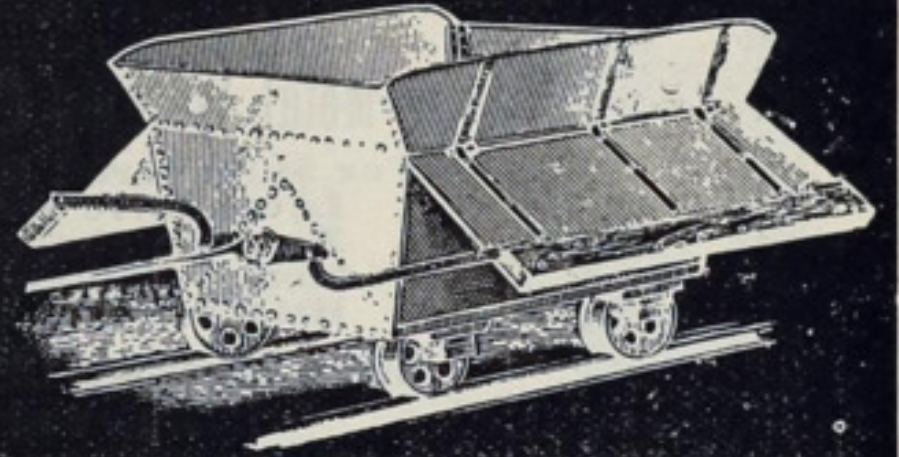
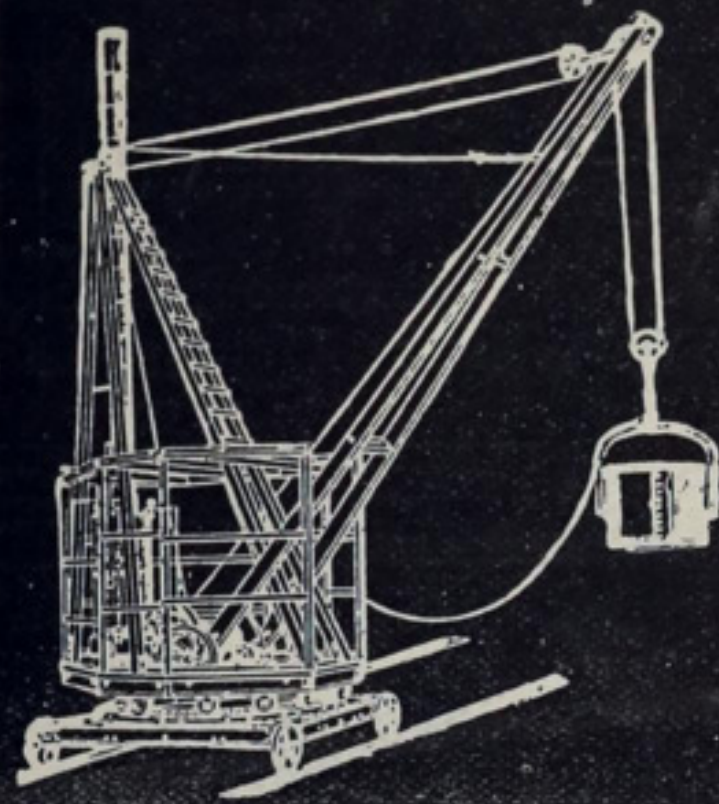
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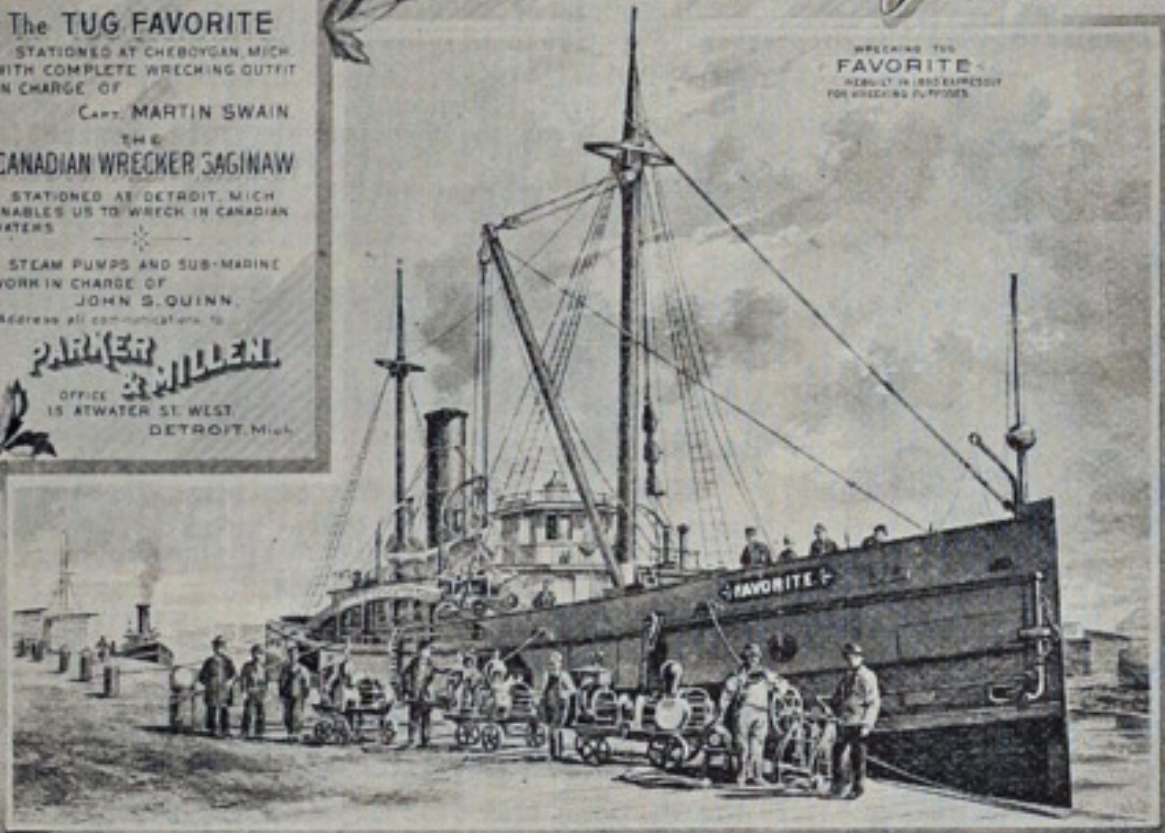
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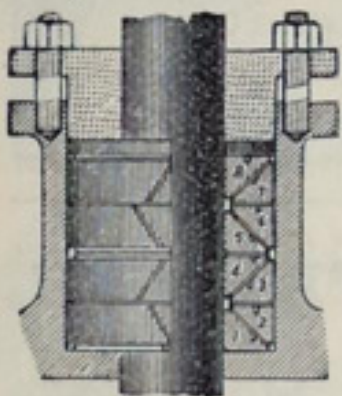
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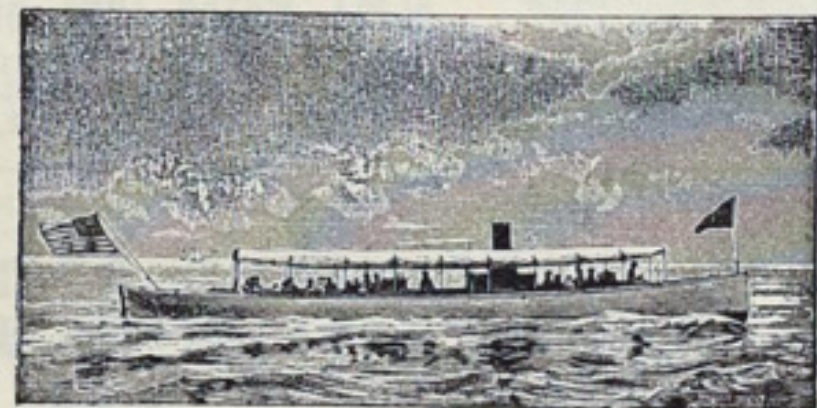
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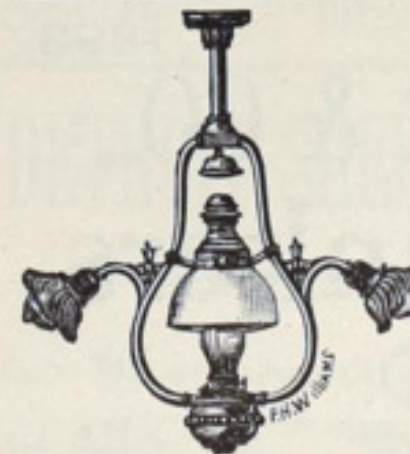
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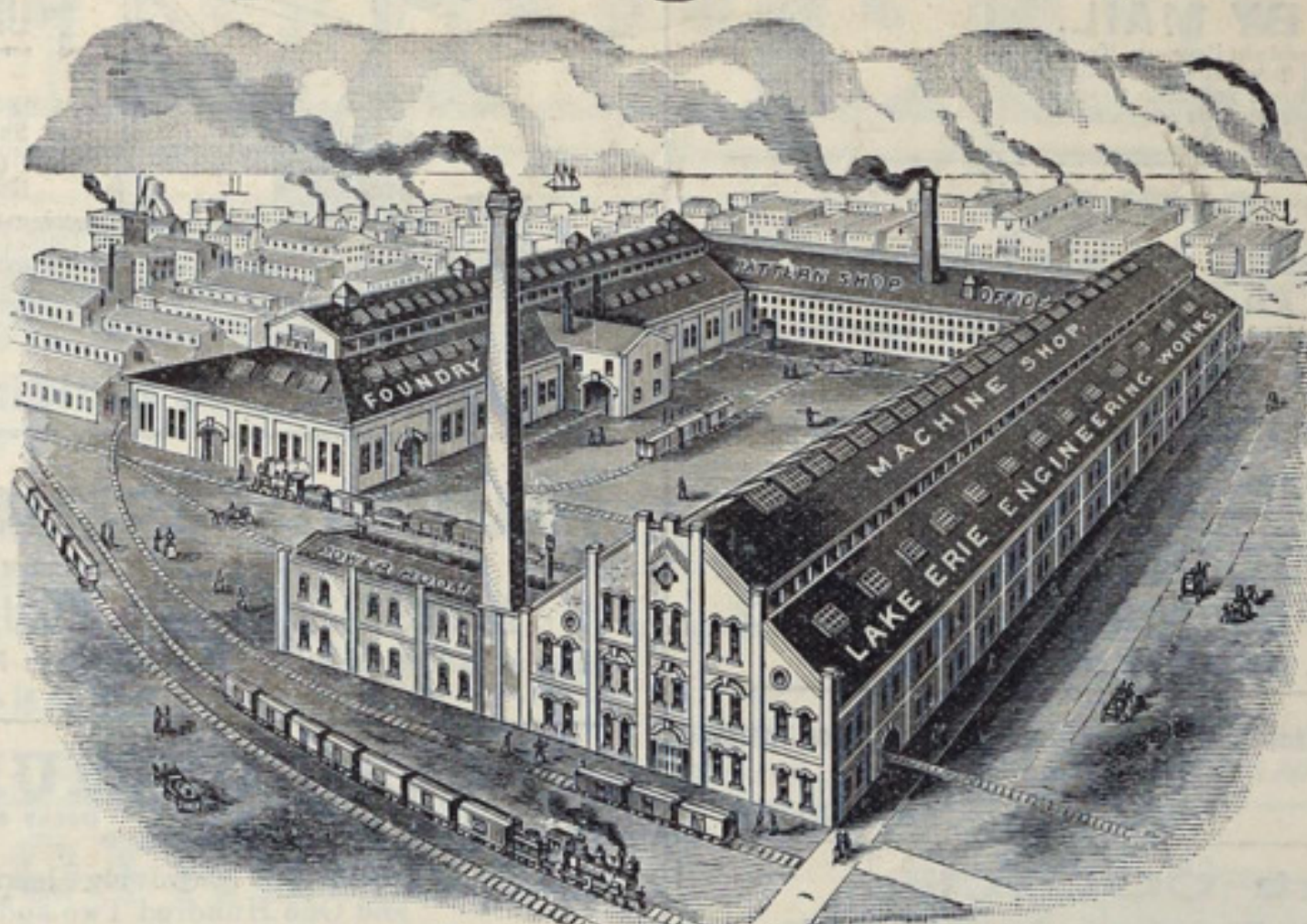
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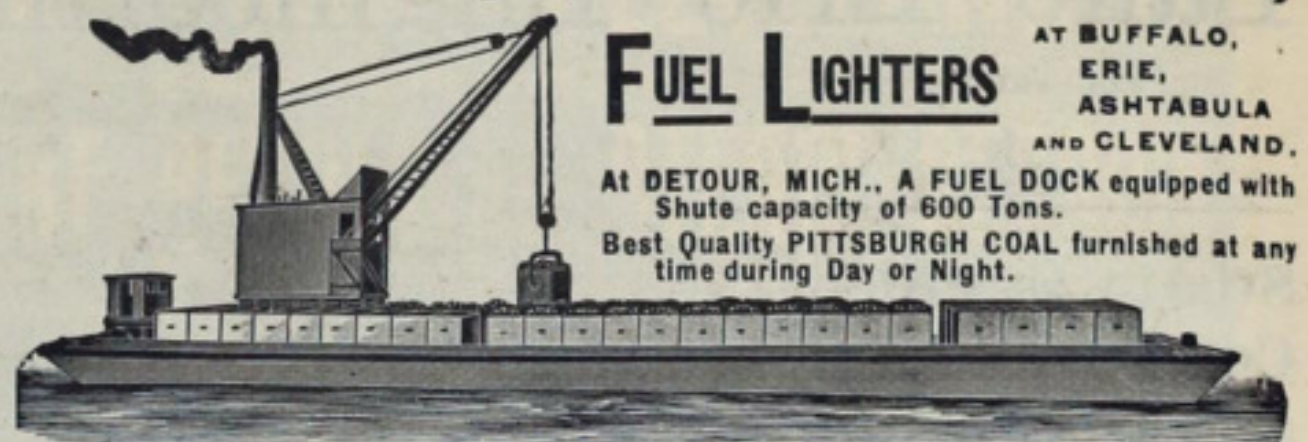
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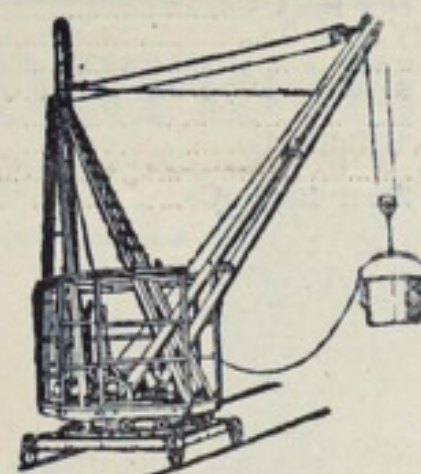
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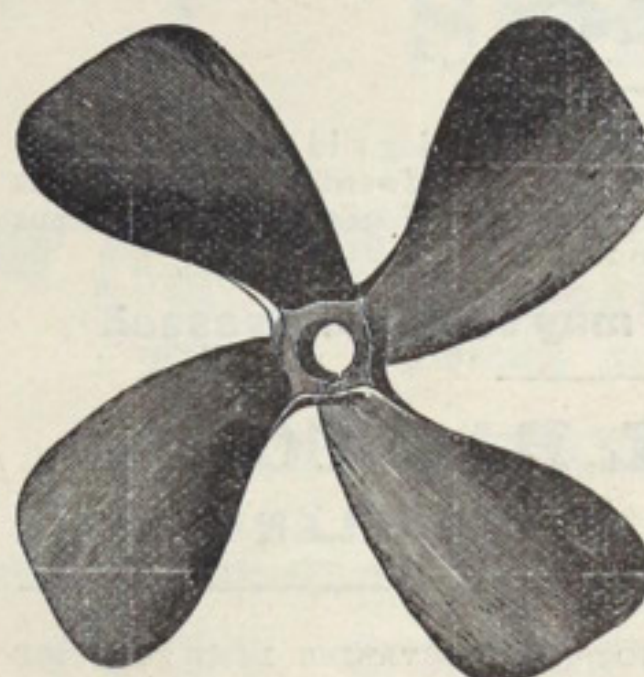
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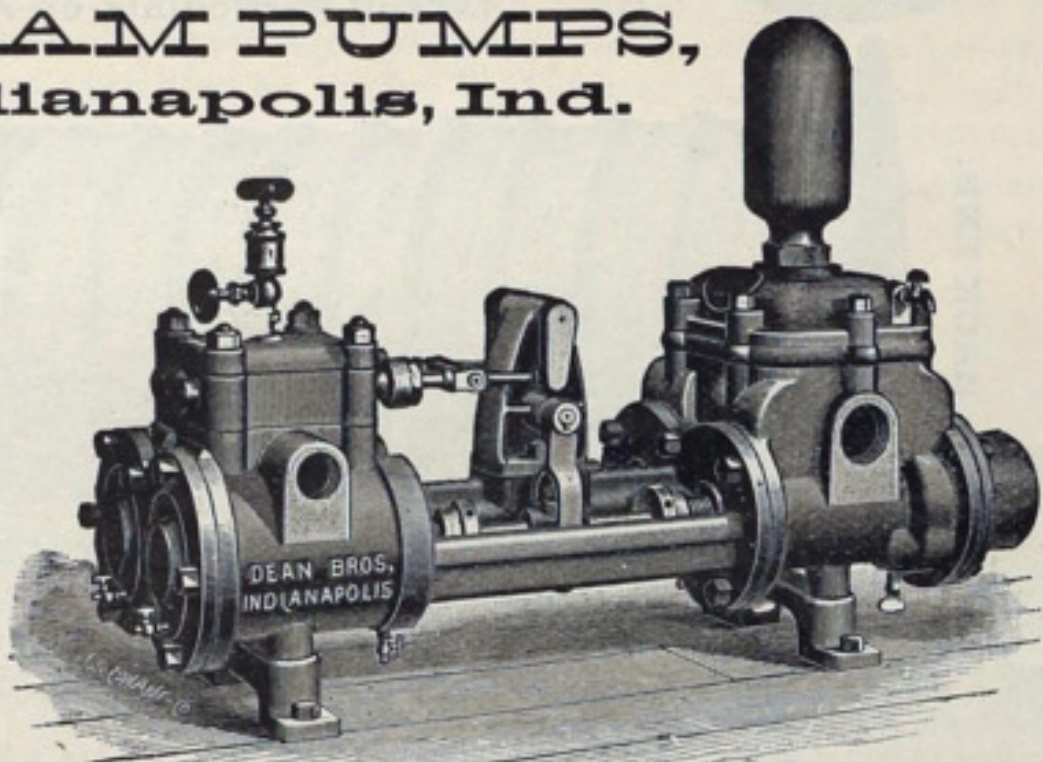
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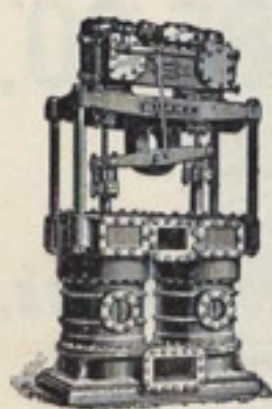
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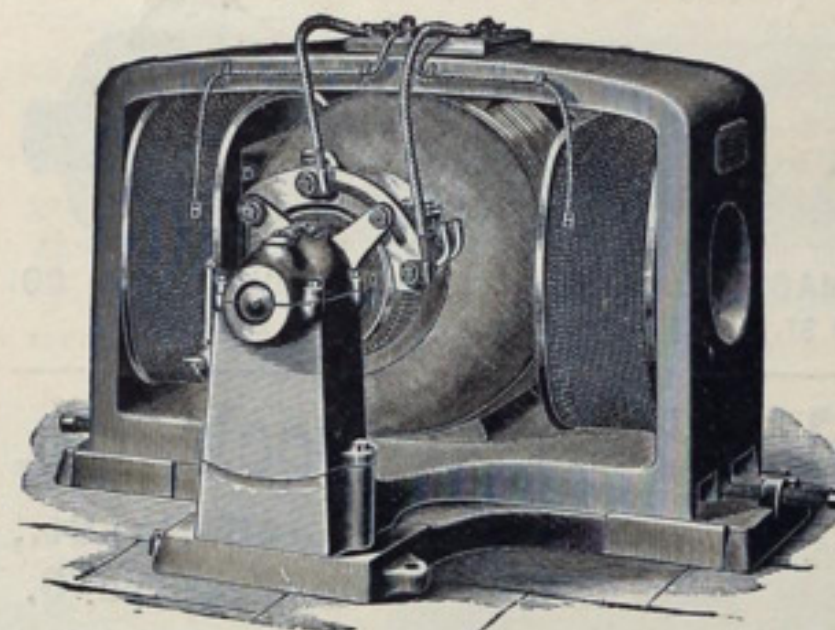


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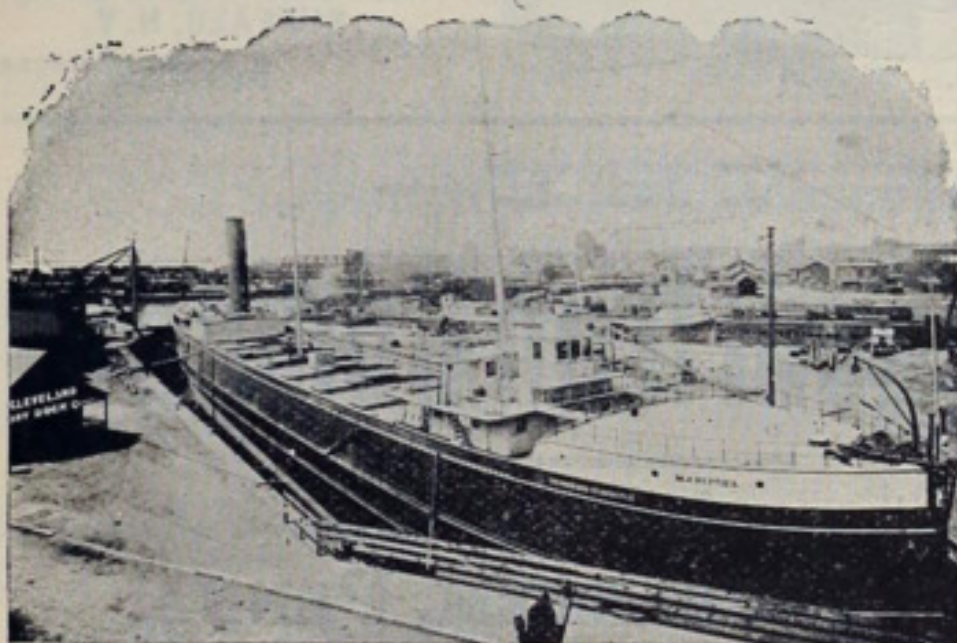
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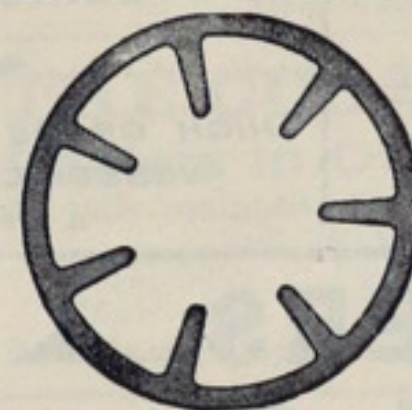
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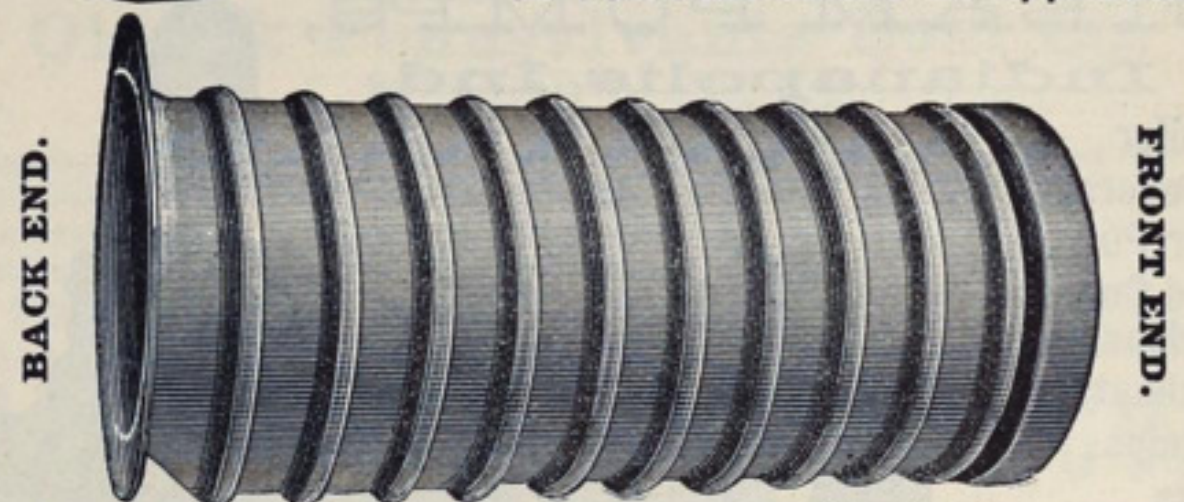
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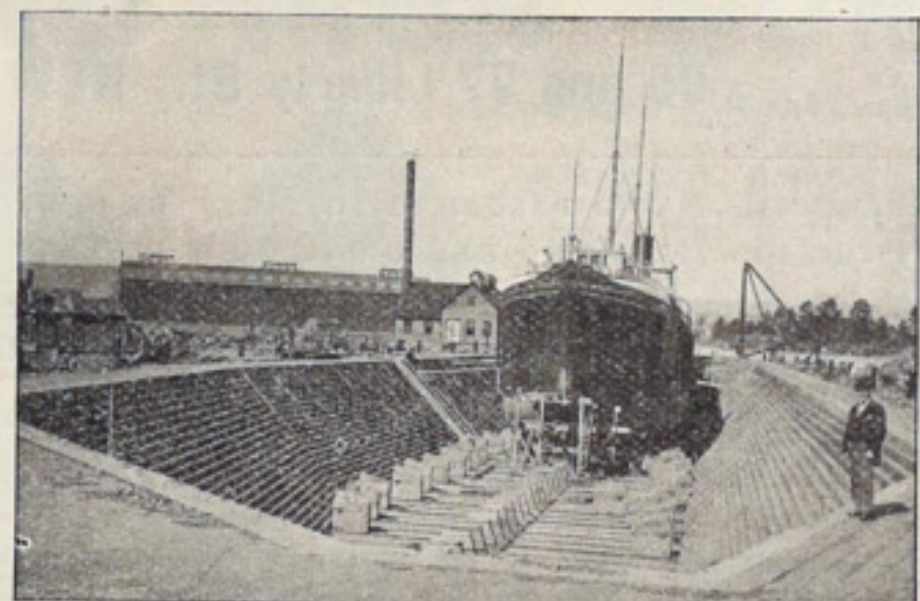
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